Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Analysis Antibody testing

Should you measure your antibody levels after a coronavirus vaccine?

Commercial tests that promise to measure your immune response aren't very useful, at least for now, finds **Helen Thomson**

IN JANUARY, I gratefully received my first dose of the Oxford/AstraZeneca coronavirus vaccine. But not everyone experiences an immune response to a shot. If mine has kicked in, I should have enough antibodies to protect me from covid-19. So it was worrying when I received results from an immunity test that suggested I had a low level of antibodies. Am I immune or not?

There are three quantitative antibody tests, or "immunity trackers", coming onto the market that are designed to tell me. The tests identify neutralising antibodies, which block the virus from attaching to and entering cells in the body. Unlike older antibody tests, which simply detect whether antibodies are present or not, the new tests can tell the level of antibodies in the blood.

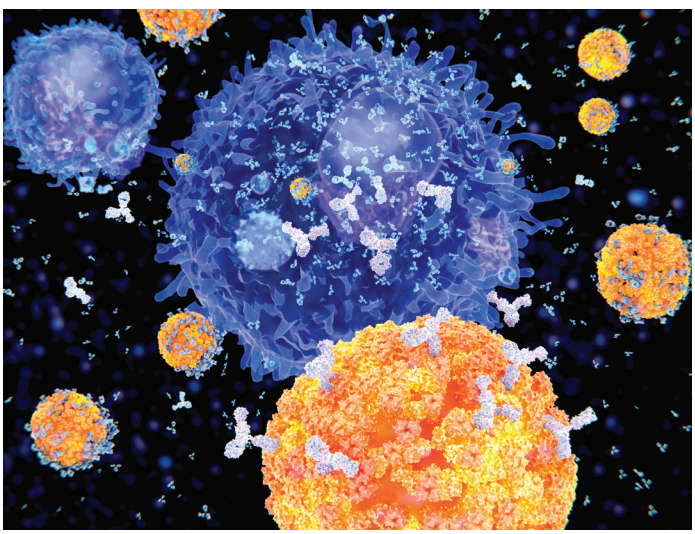
My test was developed by Swiss pharmaceutical giant Roche and I bought it through a non-profit organisation called Testing For All, for

"A positive result of any level means you are likely to be protected from severe covid-19"

£49. It takes two to three weeks for a vaccine to take effect so I took the test three weeks after my first dose.

My antibody level came back as 15.20 units per millilitre (U/mL). An article sent to me with my results explained that a positive test was any antibody level greater than 0.8 U/mL and a typical result 21 days after a second dose of the Pfizer/BioNTech vaccine was 1000 to 2000 U/mL based on a limited data set (similar information for the Oxford/AstraZeneca vaccine I had wasn't available). This left me feeling like I had a fairly low response.

I asked James Monico, co-founder of Testing For All – which aims to provide affordable testing to anyone who wants it – what he thought my result meant for my protection against covid-19.



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B-cells (orange) secrete antibodies (white) against viruses (blue)

He said that in an evaluation performed on 255 samples, the antibody level created by natural infection appeared to be between 1 and 1000 U/mL, so my result was low and that I should consider talking to my GP about it. "It's the individual's right to take their healthcare into their own hands," he says. "A low antibody response means you are more likely to get reinfected and pass it onto someone else."

My GP said he couldn't comment on antibody levels at this stage. "The NHS guidance doesn't suggest that people have their antibody levels checked. All we know is that some antibodies are better than none."

Roche says that its quantitative antibody test "can play a pivotal role in vaccine clinical trials as well as helping clinicians assess patients' immune response", but declined to comment on the sale of tests directly to consumers by organisations such as Testing For All.

How useful such tests are is also complicated by the intricacies of the immune response to a vaccine.

All of the quantitative antibody tests on the market measure the level of antibodies that recognise the outer spike protein of the coronavirus, which it uses to latch on to cells in the body. However, they don't give an indication of how powerful these antibodies are against the different coronavirus variants, nor do they give any insight into other aspects of immunity, such as B-cells, which provoke the production of further antibodies if they encounter the virus, and T-cells, which kill virus-infected cells directly. Plus, we still don't know how antibody levels relate to our ability to transmit the virus to others.

Severe covid-19

Another test on the market, developed by Sebastian Johnston at Imperial College London and his colleagues, tells people whether they have a negative result, or a low, medium, high or very high level of antibodies. He says these thresholds were determined by data they collected from 107 people who have sporadically had their antibody levels measured since April 2020, a month after contracting covid-19.

Johnston says the most important take-home message is that a positive result of any level means you are likely to be protected from getting severely ill from covid-19. However, he points out that antibody levels wane over time and that it might be useful to track your level. "From our data, people who had high or very high levels of antibodies in April are all still positive today. Many of those who were low or medium became negative over the year and some of these got covid-19 in the second wave," he says.

George Kassiotis, who studies viral infections at the Francis Crick Institute in London, thinks such test results are "effectively meaningless". He believes that the correlation between the activity of antibodies against the virus in lab tests and the real-world immunity they provide isn't clear enough to allow us to determine cut-offs above or below which an individual is protected or not.

He also worries that immunity tests might be used to argue that people with naturally acquired antibodies after infection don't need to be vaccinated, which he calls a "falsehood" given that vaccination appears to provoke a stronger immune response than natural infection.

That said, while recent studies have shown impressive results for vaccine efficacy in the real world, no vaccine is 100 per cent effective.

Knowing that I have acquired some antibodies to the coronavirus is reassuring, and I imagine many others will be tempted to buy such tests. In time, perhaps we will have a better understanding of the relationship between neutralising antibodies and immunity to the virus, but until then, tests need to come with a better explanation of what they can – and can't – tell us about our risk of contracting, or transmitting, covid-19. ▮